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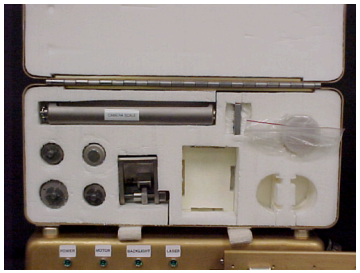
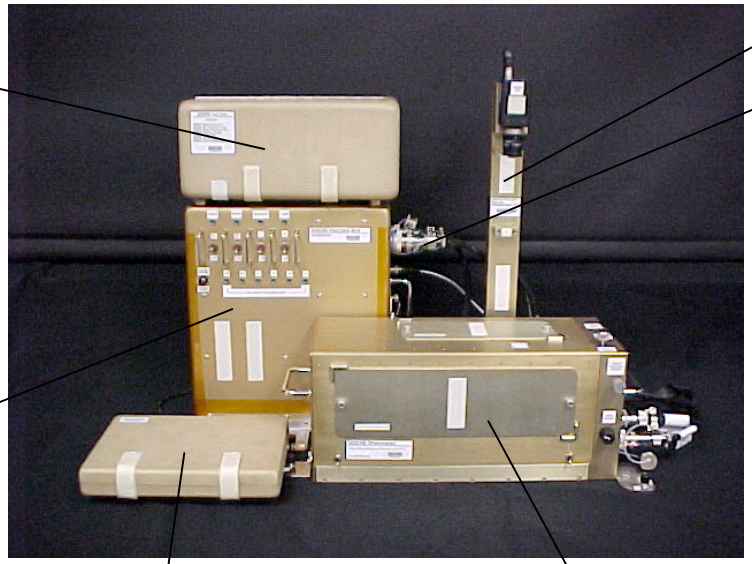
Flight Hardware
SHERE



Tool Box

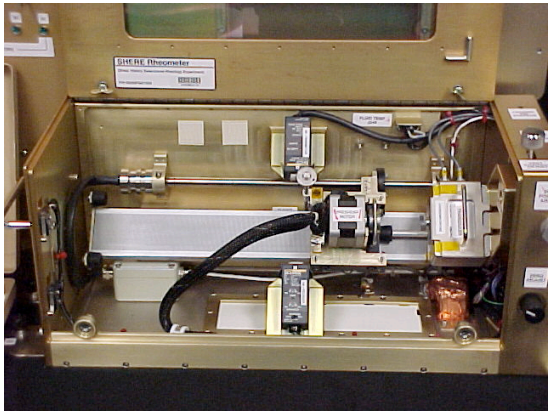


Camera Arm

Cables (QTY=7)

Interface Box

Keyboard/Mouse



Rheometer

Main Hardware:
Mass: 29.1 kg
Volume: 0.100 m^3

Fluid Module Stowage Tray
(not pictured):
Mass: 7.3 kg
Volume: 0.012 m^3

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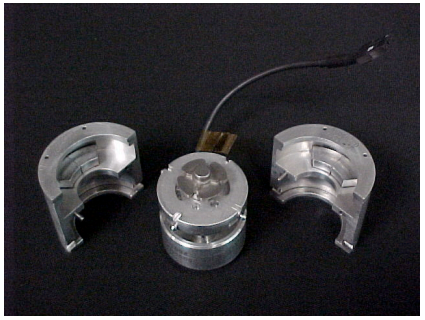
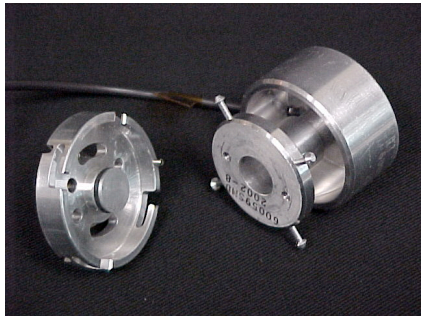
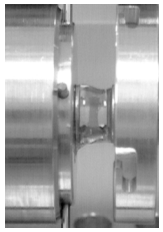


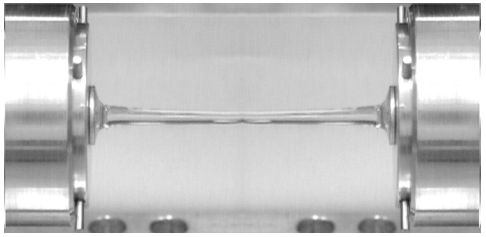
Fluid Module with
Outer Shell Removed



Fluid Module Interior

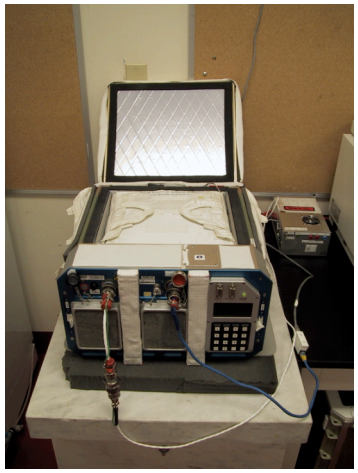


Fluid
Deployment



Polymeric Liquid Bridge
In Microgravity

Fluid Module Stowage Tray
(Contains 25 Fluid Modules)



Thermal Carrier
(20^{o} C for 24 hours)

Commercial Generic
Bioprocessing Apparatus
(CGBA)

Operations Scenario
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- Hardware Installation
- Hardware Turn-on
- Hardware Checkout
- Fluid Sample Installation
- Experiment Execution
  - Test point selected
  - Preshear and stretched (automatic exponential velocity profile)
  - Stretch stopped at 194mm length
  - Fluid allowed to relax and break in half
  - Re-position slider to starting position
  - Fluid column is recombined (if possible)
- Fluid Sample Removal (prepare next sample or testing complete)
- Hardware Shutdown
- Hardware Removal

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Constraints and Issues
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- Replacing BXF (10A) and working towards H/W turnover in April, 2007
- No slack in schedule with the following taking place:
  - Integrated testing with MSG (scheduled for March 12-16, 2007)
  - Off-gas testing at MSFC (scheduled for March 19-23, 2007)
  - EMI TIA waiver in progress (expected completion February, 2007)
- Work currently in progress:
  - Software completion
  - Verification testing
  - Final calibrations
  - Miscellaneous H/W items
- Late stowage of Fluid Modules (see next slide)
- Crew training:
  - No Increment 16 operations
  - Increment 17 operations possible

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Fluid Module Late Stowage Rationale
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- On-orbit storage time limited by Fluid Module deployment ease.
  - Test fluid begins to act like glue over long periods of time.
  - Aged fluid causes binding of the sliding seals of the Fluid Module.
  - Data shows very difficult deployment after 1.4 and 2.5 years of storage.
  - Data shows easy deployment after 2.5 and 4.4 months of storage.
  - No data for gap between 4.4 months and 1.4 years of storage.
  - 6 months chosen as conservative limit to on-orbit testing.
  - Experiment to resolve issue is impractical given schedule and H/W availability.
- On-orbit storage time is also based on PI recommended material stability criteria
- Node-2 stowage is a risk to both FM deployment and leak integrity.
- L-2 weeks late stowage has been a SHERE requirement from inception.
- FM Stowage Tray can be launched separately from main H/W at a later time.

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Progress Launch Options
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- Not possible to launch Fluid Modules on Progress
  - Late stowage item
  - Thermal extremes (freezing and heating) a concern
- Possible to launch main H/W using Progress
- Issues would involve re-qualification to higher extremes
  - Higher vibration and shock loads
  - Larger thermal temperature extremes
- Unknown if would need to re-test H/W or if can be waived